The Olentangy River Wetland Research Park: 1999 Progress

William J. Mitsch

Director
Olentangy River Wetland Research Park
School of Natural Resources, The Ohio State University

Introduction

This report represents the eighth annual report submitted to the University on research at the Olentangy River Wetland Research Park (ORWRP). It also represents a summary of the sixth year of actual hydrologic operation of the two experimental wetland basins on the site, and the third year of progress on our 7-acre billabong. Considerable improvement in infrastructure was also completed in 1999. Two of the more notable events that happened in 1999:

• The Sandefur Wetland Pavilion was completed and dedicated by President Kirwan and 300 participants in November 1999.

• We formed a Consortium with 4 other Ohio colleges and universities and won $1.2 million from the Ohio Board of Regents in a state-wide competition for a Wetland Research and Education Building to be constructed at the ORWRP. Planning for the new building was well underway by the end of 1999.

Why a Wetland Research Park?

Wetlands are shallow to intermittently flooded ecosystems that are more commonly known by such terms as swamps, bogs, marshes, and sedge meadows. They are revered as important parts of the natural landscape because of their functions in cleaning and retaining water naturally and in providing a habitat and food source for a wide variety of plant and animal species. It is estimated that more than half of the original wetlands in the lower 48 states have been lost to drainage projects and human development projects. Ohio has lost about 90 percent of its original wetlands.

When we lose wetlands, we lose their ability to provide clean water, prevent floods and enhance biological diversity. Many organizations are calling for construction of new wetlands to clean up our streams, rivers, and lakes. The National Academy of Sciences has called for the restoration and creation of 10 million acres of wetlands in the United States by the year 2010.

We need to know: 1) how wetlands work; 2) if we can create and restore them; and 3) the best approaches to creation and restoration of wetlands. The Olentangy River Wetland Research Park is designed to be a long-term, large-scale wetland research facility on a major college campus. There is no other facility of its kind on any other campus in the USA.

Progress at OSU's Wetland Site

The Olentangy River Wetland Research Park is located on a 30-acre site owned by the Ohio State University, immediately north of Dodridge Road and adjacent to the Columbus campus (Figure 1). The site has been developed in three phases:

Phase 1 — Construction of two experimental wetland basins and their water delivery system;

Phase 2—Development of a research and teaching infrastructure at the site including boardwalks, experimental mesocosms, a plant-material greenhouse, additional wetlands, instrumentation for long-term research, and a visitor pavilion; and

Phase 3—Development and construction of a wetland research/education building on the site.

Phase 1 of site development, which featured construction of two 2.5-acre deepwater marshes and a river water delivery system, was completed in 1994. Pumps were installed on the floodplain to bring water from the Olentangy River to the wetlands and pumping officially began on March 4, 1994. River water is pumped continuously, day and night, into the two wetlands. It then flows by gravity back to the Olentangy River through a swale and constructed stream system. In May 1994, one wetland basin was planted with marsh vegetation typical of wetlands in the Midwest; the other remained as an unplanted control. This has become the major full-scale "Experiment" at the site.

Phase 2, establishing the infrastructure for research and education of the site, began in 1994 and was completed in 1999 with the dedication of the Sandefur Wetland Pavilion. The status of the site at the end of 1999 is illustrated in Figure 2.

Phase 3, the construction of the Wetland Research and Education Building at the ORWRP, began in earnest with the receipt of a $1 million grant from the Ohio Board of Regents. Planning that includes a Memorandum of Understanding among University Officials and a Program of Requirements (PoR) that outlines the functions of the various rooms in the new building were begun in 1999.

Sandefur Wetland Pavilion

A major new development at the Olentangy River Wetland Research Park in 1999 was the completion of a wetland pavilion for site visitors. A generous donation by

Figure 1. Aerial photograph of Olentangy River Wetland Research Park, just north of the Ohio State campus, from August 1999.

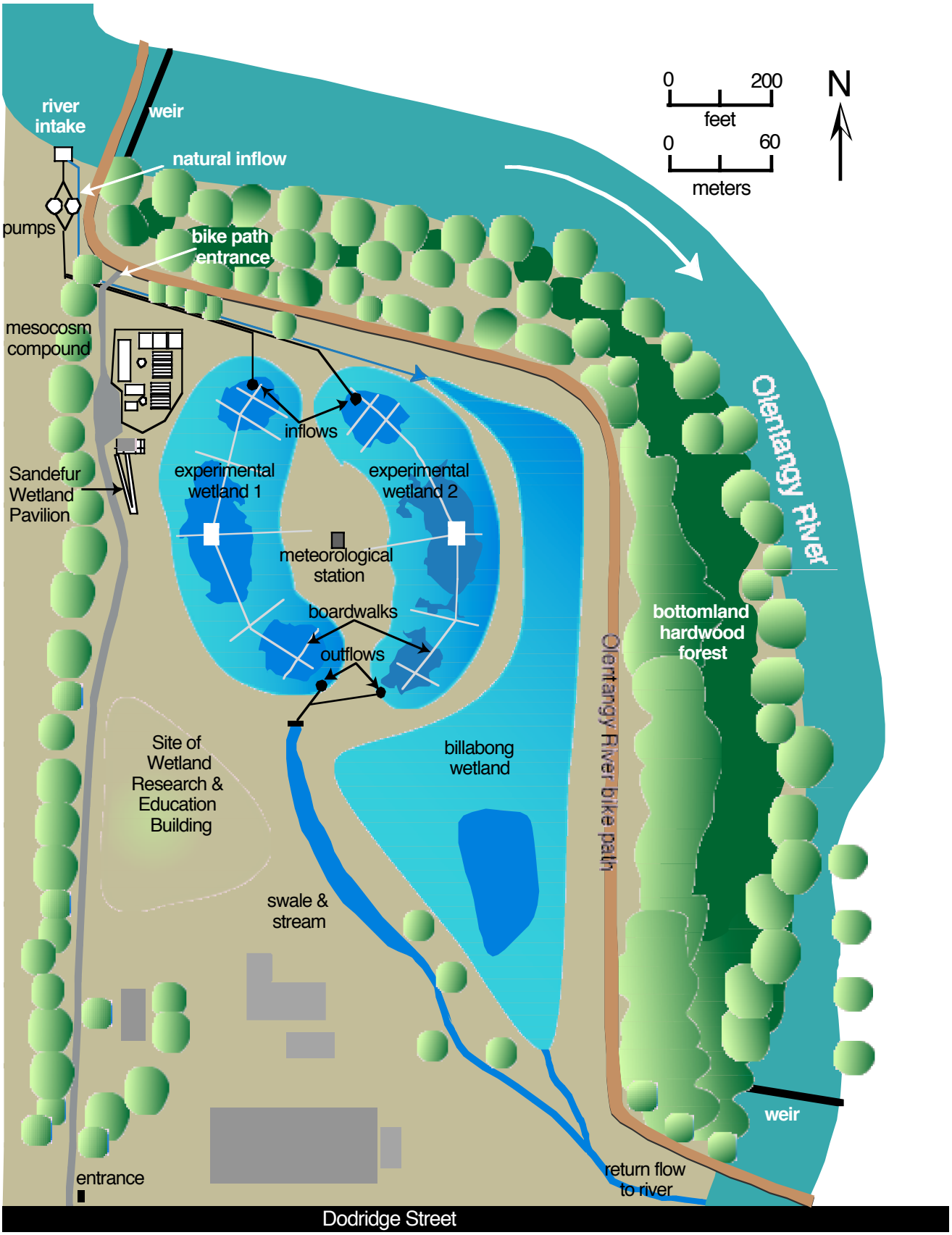

Figure 2. Progress at the Olentangy River Wetland Research Park through December 1999. Phases 1 and 2 are completed and Phase 3, development of the Wetland Research and Education Building, began in 1999.

John and Tana Sandefur in 1997 led to plans for the two-story observation deck (Figure 3), that now serves as a starting point for guided wetland tours and as a site for unsupervised visits by people visiting the site by car, walking, or bicycle. Groundbreaking occurred on October 16, 1998 with OSU President Brit Kirwan, John and Tana Sandefur and 200 visitors and friends of the wetland project in attendance. An equally festive event was held on November 12, 1999 when the Sandefur Wetland Pavilion was dedicated (Figure 4). This event featured presentations by President Kirwan, Vice-President Bob Moser, and ORW Development Committee Jerry Pausch. It was attended by 300 university personnel, students, and local "Friends of Buckeye Swamp."

Teaching, Research, and Service

Teaching

Integrating wetland research with University teaching has been an emphasis at the Olentangy River Wetland Research Park since its inception. From the time that a Natural Resources graduate seminar class in 1991 helped to design the project, dozens of formal courses involving thousands of students have made use of the site for ecological or other projects related to wetlands or the river. These formal courses include classes on wetlands, water quality, ecological engineering, anthropology, architecture, environmental impact analysis, animal ecology, ornithology, and forestry. Nine OSU classes involving several hundred students formally used the site in 1999 (Table 1). In addition, the site is used for dozens of hours of undergraduate and graduate research credit hours.

Research

Since the wetland project first began in 1992 and especially since the two 1-ha basins were flooded on March 4, 1994, dozens of research projects have been initiated on the project by graduate and undergraduate students and post-docs from Ohio State University and elsewhere. Results of those research projects are presented annually in these annual reports. A total of 30 students have completed dissertations, master's theses, or honor's undergraduate theses with partial or full use of the Olentangy River Wetland Research Park from 1992 through 1999 (Table 2). While most student are from Ohio State, there have been 4 students from Europe (two from UK, two from Denmark) who collected thesis data at the ORWRP. Dozens of organizations in addition to Ohio State have collected data or conducted research at the ORWRP.

As a result of having the ORWRP, $2.7 million in research funding to The Ohio State University Research Foundation (OSURF) and the Office of Research has been secured in the past 4-5 years (Table 3). Coupled with the $1 million raised for the site through University Development, a total of $3.7 million has been obtained from extramural funding because of or for this wetland research park.

Service

Interest by the public continues to grow. We had 91 tours or public presentations on the Olentangy River Wetland Research Park in 1999 to almost 2,000 individuals (Table 4). The number of tours given continues to rise (Figure 5). Some of those taking the tour were well-known scientists and engineers including Eugene Odum, University of Georgia, Joe Delfino, University of Florida, Gordon Spoor, Cranfield University, England, and Chris Tanner and Long Nguyan, National Institute of Water and

Table 1. Formal OSU class use of Olentangy River Wetland Research Park, 1999.

Term	Course	Number of Students	Instructor
Winter 1999			
	NR 979B Special Topics in Wetland Ecology	7	Mitsch
	EEOB 413 Principles of Ecology	44	Snow
	EEOB 625 Mammalogy	65	Harder
Spring 1999			
	NR 355 Water Quality Management	80	Wang
	NR 662 Wildlife Ecology Methods	44	Gates
	NR 200 Ecosystem Management	80	Johnson/Wilz
	LARCH 323/626Landscape Construction: Water in the Landscape	35	Breeden
Autumn 1999			
	NR 725 Wetland Ecology and Management	25	Mitsch
	NR 355 Water Quality Management	35	Bouchard
	EEOB 661 Conservation Biology	12	Harder

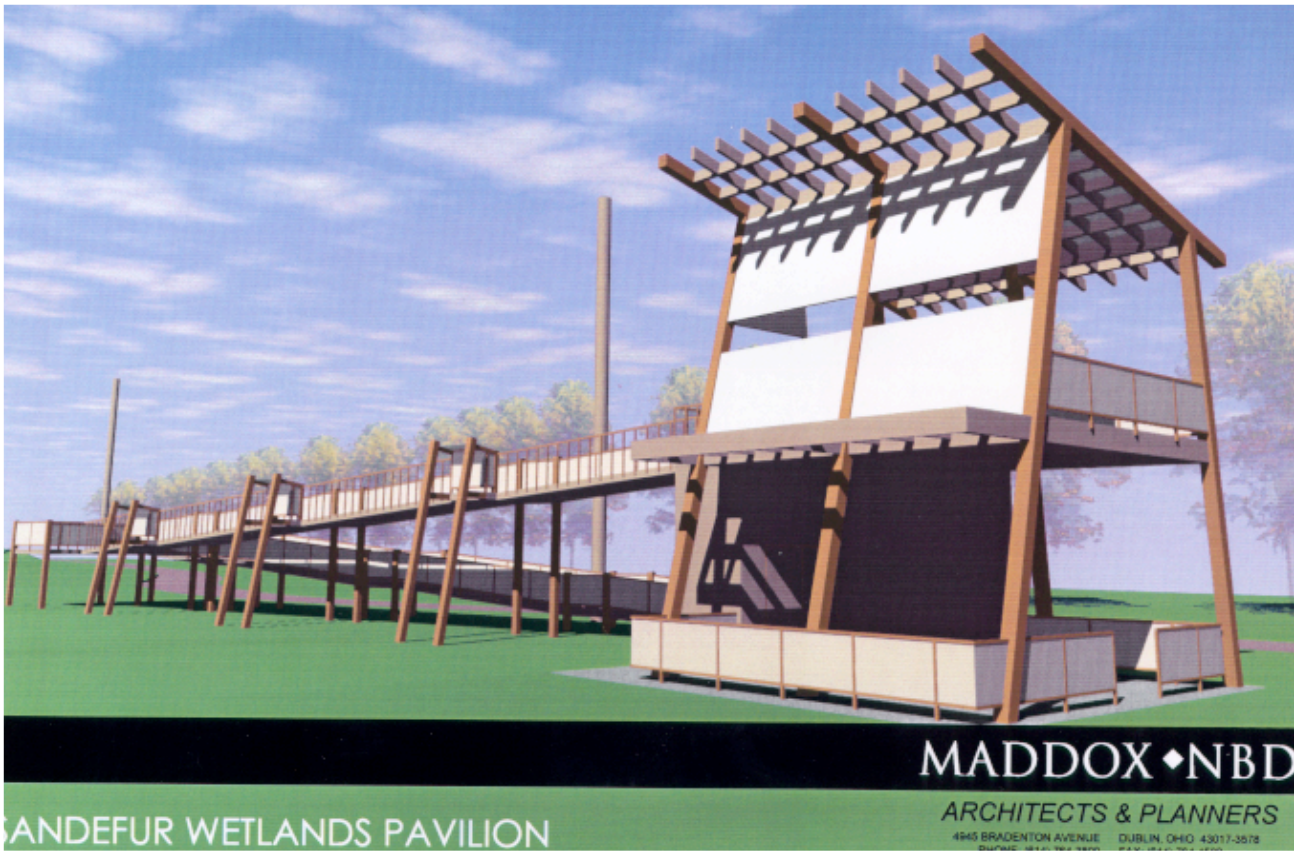

Figure 3. above: Artist's sketch of Sandefur Wetland Pavilion; below: actual Sandefur Wetland Pavilion as completed in 1999.

Figure 4. Scenes from the dedication of the Sandefur Wetland Pavilion at the Olentangy River Wetland Research Park, November 12, 1999. a. William "Brit" Kirwan, OSU President; b. Bob Moser, Vice-President for Agricultural Administration, OSU; c. tent setup for 300 participants at dedication; d. ribbon cutting with (l. to r.) back row: William "Brit" Kirwan, OSU President, Bob Moser, Vice-President for Agricultural Administration, Tana and John Sandefur, principal donors for the pavilion, William J. Mitsch, Director, ORWRP; Jane and Phil Taylor, members of the ORWRP Advisory Committee, Jerry Pausch, Chair, ORWRP Advisory Committee; front row: Taylor children, grandchildren of the Sandefurs; e. Pavilion with visitors after ribbon-cutting. f. Bill Mitsch giving award to post-doc Naiming Wang; g. John and Tana Sandefur in the pavilion; h. Phil Taylor with children on the boardwalk.

Table 2. Theses and dissertations completed at least partially at the Olentangy River Wetland Research Park through 1999.

The Ohio State University

Undergraduate honor's theses

- **Erika A. Filippi** "The role of soil organic matter on denitrification potential in newly created wetlands" Natural Resources (1998)
- **Bonnie F. Elfritz** "A comparison of natural wetlands with a constructed wetland using the Floristic Quality Assessment Index" Natural Resources (1998)
- **Kimberly K. Schamp** "Groundwater patterns before and after wetland construction at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Nicole L. Vorwerk** "Comparison of three years of pH values between planted and unplanted wetlands at the Olentangy River Wetland Research Park" Natural Resources (1997)
- **Rainie D. Gardner** "Fish recruitment in the Olentangy River constructed wetlands" Natural Resources (1997)
- **Tonya Cheek** "Effect of fish on wetland water quality" Natural Resources (1996)
- **Andrew W. Wehr** "Early water quality of created wetlands at the Olentangy River Wetland Research Park" Natural Resources (1995)
- **Michael E. Berkal** "Hydrology and water chemistry of the Olentangy River in Worthington (Franklin County), Ohio, and their potential effects on a future constructed wetlands facility downstream in Columbus, Ohio" Natural Resources (1992)
- **Douglas G. Stuart** "Intensive water quality sampling in two constructed riparian wetlands" Natural Resources (1992)

Ph.D. dissertations

- **Douglas J. Spieles** "Nutrient retention and macroinvertebrate community structure in constructed wetlands receiving wastewater and river water" Environmental Science Graduate Program (1998)
- **Randall J.F. Bruins** "Modeling of flooding response and ecological engineering in an agricultural wetland region of Central China" Environmental Science Graduate Program (1997)
- **Neal E. Flanagan** "Comparing ecosystem structure and function of constructed and naturally occurring wetlands: Empirical field indicators and theoretical indices" Environmental Science Graduate Program (1997)
- **Robert W. Nairn** "Biogeochemistry of newly created riparian wetlands: evaluation of water quality changes and soil development" Environmental Science Graduate Program (1996)
- **Naiming Wang** "Modelling phosphorus retention in freshwater wetlands" Environmental Science Program (1996)
- **Paul E. Weihe**,"Colonizing and introduced vegetation in created riparian wetlands: Establishment during the first two growing seasons" Environmental Science Graduate Program (1996)

Master's theses

- **Sarah K. Harter** "Patterns of short-term sedimentation in a freshwater created marsh" Natural Resources (1999)
- **Sharon A. Johnson** "Effects of hydrology and plant introduction on first-year macrophyte growth in a newly created wetland" Natural Resources (1998)
- **Lisa J. Svengsouk** "First-year response of *Typha latifolia* L. and *Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla to nitrogen and phosphorus additions in experimental mesocosms" Environmental Science Graduate Program (1998)
- **Kathleen D. Metzger** "Self-design of a fish community in a created riparian freshwater marsh: A simulation model" Environmental Science Graduate Program (1997)
- **John S. Koreny** "Hydrology of a constructed riparian wetland system: Characterization and predictive modeling" Environmental Science Graduate Program (1996)
- **Uygar Özesmi** "A spatial habitat model for the marsh-breeding red-wing blackbird (*Agelaius phoeniceus*) in coastal Lake Erie wetlands" Environmental Science Graduate Program (1996)
- **Doreen M. Dudek** "Tree growth responses to streamflow in a bottomland forest in central Ohio" Natural Resources (1995)
- **Steven F. Niswander** "Functional analysis of a created in-stream mitigation wetland: hydrology, phosphorus retention, and tree growth" Natural Resources (1994)
- **Renée F. Wilson** "Progress and success of five mitigation wetlands in Ohio" Natural Resources (1995)
- **Karen M. Wise** "Evaluation of acid mine drainage control by a constructed wetland in southeastern Ohio" Natural Resources (1994)
- **Frank D. Voss** "Groundwater investigation of Ohio State University wetland site" Geodetic Science (1993)

Theses at Other Universities

- **Hojeong Kang** "The significance of enzyme activities in wetland biogeochemistry" University of Wales, UK (1999)
- **Pernille Mortensen** and **Pernille Lanzky** "Water quality improvement in a constructed wetland" Thesis, Royal Danish School of Pharmacy, Copenhagen, DENMARK (1996)
- **Rebecca Smith** "Nitrogen transfer in groundwater in the riparian zone of the Olentangy River, Columbus, Ohio" Thesis, Cambridge University, Cambridge, England, UK (1996)

Table 3. Extramural funding to Ohio State University Research Foundation at the Olentangy River Wetland Research Park, 1995-1999 to four Colleges at OSU.

RF #	Short title	Funding Source	College	Amount	end date
735542	Watershed wetland demonstration	Indian Lake Demo Project	FAES	$18,225	2/28/01
731631	Constructed wastewater wetland	SW Licking Co W&S District	FAES	$175,028	6/30/00
735457	Solving hypoxia in the Gulf of Mexico	NOAA/USEPA	FAES	$97,000	12/31/99
733247	Reuse of clean coal FGD material	Ohio Dept of Development	ENG	$387,669	10/31/99
738587	Restoration of a bottomland forest	Ohio Dept Transportation	FAES	$75,000	5/1/06
733487	A mitigation wetland	Pine Grove, Inc.	FAES	$54,242	12/31/01
736809	Molecular biodegradation in wetlands	USDA	MAPS	$90,000	9/30/01
737009	Pesticide phototransformation in wetlands	NOAA	BIOL SCI	$150,000	7/31/00
738869	Reuse of clean coal FGD material, part 2	Ohio Dept of Development	ENG/FAES	$470,000	1/31/03
	Center for Wetland and River Restoration	Ohio Board of Regents	FAES	$1,180,000	6/30/02
	TOTAL			$2,697,164	

Atmospheric Science, Hamilton, New Zealand.

Publicity

The Olentangy River Wetland Research Park was publicized 15 times in 1999 in several newspaper articles (Table 5). The Columbus Dispatch featured articles about the wetlands three times during 1999. The Sandefur Pavilion dedication event was covered in several campus and local publications. In December 98/January 99, an article written about the ORWRP was distributed to 600,000 readers in the National Wildlife Magazine. Copies of all the articles published on the site in 1999 are given in the Appendix of this annual report.

The Plan

The Master Plan

Substantial progress has been made on this project for the past 8 years. Phase 2 was completed in 1999 and Phase 3, the last phase of site development shown in the site master plan was begun in late 1999. The site master plan (Figure 6) calls for construction of a wetland research/education building. Substantial progress was made on planning this building project in 1999 and key funding that will make the building a reality was secured in 1999.

Development and Other Capital Support Through 1999

The Olentangy River Wetland Research Park was supported through its first seven years (1992-98) almost entirely through private donations to the University. Through December 1999, the equivalent of almost $1,000,000 ($992,953) has been raised for the wetland project (Table 6), mostly from corporations and individuals. In 1999, there were 146 identifiable donations in 1999 for a total of $115,576.

In 1999, we were successful in obtaining $1.18 million from the Ohio Board of Regents for the Wetland Research and Education Building. Coupling this amount with a matching pledge of $300,000 from OARDC for the wetland building, the entire building project has raised about $1.5 million. The distribution shown in Figure 7 shows that a substantial amount (39%) comes from development, 47% from the Ohio Board of Regents, and 14% from OARDC.

Corporate support of this project has been quite noteable. We have identified about 60 corporations and other organizations that have supported this project over the years (Table 7).

In-Kind Donations

About one-third of the donation amount that we have received since 1992 has been as in-kind contributions including boardwalk material, a new 7-acre wetland, even an ORWRP Geo Tracker. In 1999, we received an in-kind refurbishing of the driveway from Agg Rok Materials, Columbus, OH; and support on geotechnical services from BBC&M Inc.

A Research and Education Building

A wetland research and education building will be built on the site in the next 1 to 2 years to take full advantage of the campus wetlands and to relieve overcrowding of labs, offices, and research facilities on campus. A sketch of the facility, provided by Professor Yosef Marzeki's senior design class in the Knowlton School of Architecture, is shown in Figure 8. The building would house a state-of-the-art control room or "operations theater" where every physical, chemical, and biological change in the wetland could be monitored in real time by staff wetland scientists. It would also include a conference center for continuing education-type courses and University courses on wetlands. The building would also include faculty and student offices, wet-laboratories for water analysis, a soil-water-plant analysis prep room (mud room), a computer laboratory,

Table 4. Tours and non-scientific presentations of the Olentangy River Wetland Research Park, 1999.

Date		Organization	Est. Number
6-Jan	**	Robert Rhykerd, candidate Microbiology position	1
7-Jan	*	Angela Conklin, prospective grad student	2
13-Jan	**	Joe Delfino, Chair, Env Eng Sciences, University of Florida	1
20-Jan	*	OSU Ecology 413 class (Alison Snow)	12
21-Jan	*	OSU Ecology 413 class (Alison Snow)	20
22-Jan	*	OSU Ecology 413 class (Alison Snow)	12
26-Jan	**	Environmental Law Institute, Jessica Bennett	2
11-Feb	**	Bob Blackman, Univ of Arkansas	1
15-Feb	*	Univ Architect Office - Julie Karovic	1
26-Feb	*	ORW Campus Advisory Committee	5
3-Mar	*	Ohio Division of Wildlife Annual Meeting (Topic: Wetlands)	15
5-Mar	*	ORW Advisory Committee (Bill Heffner, Bill Resch)	2
12-Mar	*	Prospective Student-Christy Pirkle	1
13-Mar	*	Prospective Student-Cheri Higgins	1
18-Mar	**	Eugene P. Odum, Prof Emeritus, Univ of Georgia	1
27-Mar	*	Boy Scout Troop (incl. site cleanup)	20
27-Mar	*	Girl Scout Troop	25
29-Mar	*	Pipeline 2000	3
31-Mar	*	Columbus Foundation (Jennifer Heller)	15
	*	NR 662, Spring Quarter 99, for Lab/Field Exercises (Bob Gates)	44
13-Apr	*	SNR “A” Team (Thea Cesner)	45
14-15-Apr		Nielsen Environmental Field School	5
17-Apr	*	Miami University- Botany Club	10
17-Apr	*	Cub Scout Troop	18
20-Apr	*	Landscape Architecture 323 (Brooks Breeden)	35
27-Apr	*	Village Academy 9th Graders	40
27-Apr	**	Eco Eng candidate - Julie Cronk	1
29-Apr	*	Prospective Students	2
29-Apr		1st Community Village Talk	40
30-Apr	*	Indiana University-SPEA class	6
3-May	*	J. Kaulfield et al.	3
4-May	*	Kenyon College (Siobhan class)	10
6-May	**	Eco Eng candidate - Andy Cole	2
10-May	**	Eco Eng candidate - Sherry Brandt-Williams	2
11-May	*	Ohio Parks and Rec. Law Enforcement	10
13-May	*	NR 200, SP 99, Kate Wiltz	60
17-May	**	Eco Eng candidate - Ben Hodges	1
19-May	*	Weaver Middle School (7 th grade)	80
19-May	**	Gordon Spoor, Cranfield University, England	3
21-May	*	Indian Springs Elementary Gifted 4th & 5th grade	25
26-May	*	Preservation Parks 3rd & 5th grade	50
27-May	*	Flowerpot Group from Norwester	15
2-Jun	*	Columbus State Biology class	15
3-Jun	**	Eco Eng candidate - Michael Schwar	
9-Jun	*	Ohio River Basin Commission	10
14-Jun	**	Eco Eng candidate-Karen Skubal, Univ of Michigan	1
15-Jun	**	Eco Eng candidate - Jenny Brown	2
18-Jun	**	Eco Eng candidates - Tim Granata, Greg McIsssac, Univ of Illinois	4
6-Jul	**	Chris Tanner, NIWA, New Zealand	1
6-Jul	*	OSU Arts & Sciences Summer Program	40
16-Jul	*	OSU-Lima	2
17-Jul	*	Franklin County OSU Alumni Group	6
19-Jul	**	Long Nuygen, NIWA, New Zealand	1
26-Jul	*	Pat Hatcher and 5 students	6
5-Aug	*	Martin Essex School for the Gifted	50
10-Aug	**	Louisiana State University Engineers (John Sanceloni, Ron Malone, Kelly Rusch)	3
11-Aug	*	Igel Construction Company (Bill Igel)	2
16-Aug	**	Wetland Creation and Restoration Short Course	20
20-Aug	*	University Architect’s admin office	6

Table 4, continued

24-Aug	*	Chadwick Arboretum Interns	20
31-Aug	*	Columbus State Biology class	20
31-Aug	*	SNR Russian Visitors	12
2-Sep	*	Groveport Compost Group and other local agency members	10
9-Sep	*	Bud Baeslack, OSU VP of Research	1
15-Sep	*	Dennison U. Lab class (Karl Korfmacher**, instructor)	15
28-30-Sep	*	John Harder class-site use	20
21-Sep	*	Wellington School, 6th grade	43
22-Sep	*	Northwest Garden Club	10
24-Sep	*	Home School Group, ages 5-12	30
24-Sep	*	Ashton Middle School	60
28-Sep	*	Chapman Elementary, 3rd & 4th graders	35
29-Sep	**	Bill Coleman, EPRI	1
30-Sep	*	NR 725 Wetlands Class	25
4-Oct	*	Dick Stoddard, Office of the President	1
5-Oct	*	Nature Conservancy	15
8-Oct	*	NR 355	35
8-Oct	*	College Development Committee	20
8-Oct		Joe Bailer, OSU Extension	3
11-Oct	*	College for a Day Student/Parents	3
22-Oct	*	Potential ESGP Students	10
23-Oct	*	Parents Association	200
23-Oct	*	Potential ESGP Students	10
29-Oct	**	Dr. James Chapman, Shawnee State University	6
29-Oct	*	Immaculate Conception School	60
29-Oct	*	University Communications	3
1-Nov	*	Luke Russel from the Lantern	1
8-Nov	*	St. Agatha Student/Parent	2
12-Nov	*	Dedication of Sandefur Pavilion	300
15-Nov	*	Columbus State	13
18-Nov		Franklin Park Conservatory	25
8-Dec	*	Columbus Dispatch	3
8-Dec	*	Dublin Scioto High School Teachers	4
15-Dec	*	Nikki Husat-prospective student	1
		TOTAL	1832
		# of Tours/Presentations	91

*site tour
**site tour with visiting scientist or distinquished visitor

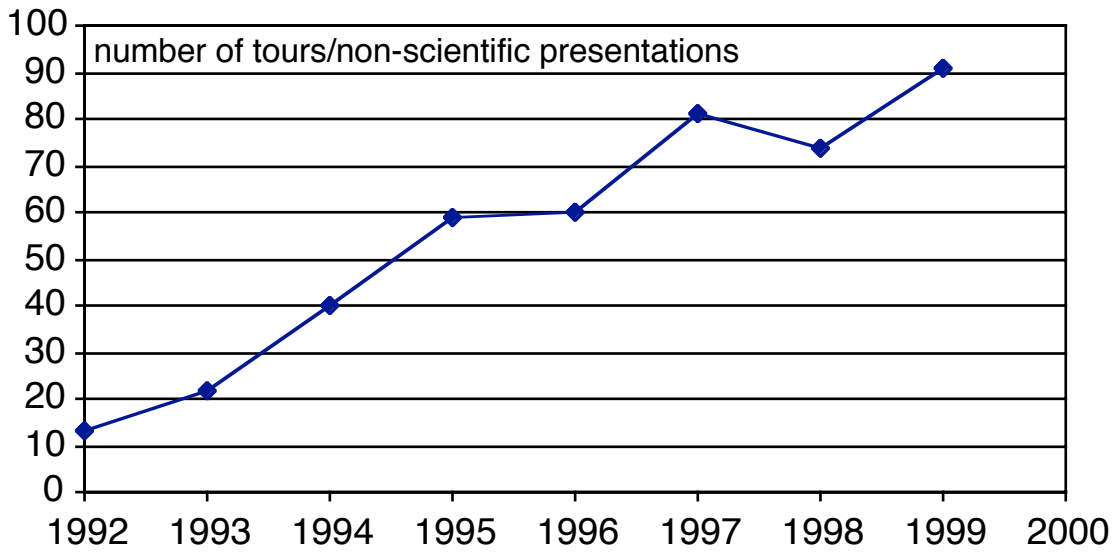

Figure 5. Number of tours and non-scientific presentations on the ORWRP from 1992 through 1999.

Table 5. Press and media coverage of the Olentangy River Wetland Research Park, 1999.

Date	Article Title or Event	Publication
Jan 1999	"When it comes to building wetlands, scientists still can't fool mother nature"	National Wildlife
July 7, 1999	"St. Agatha scout...."	Upper Arlington News
July 8, 1999	"Summer coat"	The Columbus Dispatch
July 25, 1999	"Research projects across state boosted by nearly $10 million"	The Columbus Dispatch
August 3, 1999	"More wetlands could shrink gulf's dead zone"	The Columbus Dispatch
Sept 1999	"Solutions to Gulf's hypoxic zone offered"	enVision
Sept 1999	"Wetland research park wins funding"	enVision
Sept 1999	"Sandefur wetland pavilion"	enVision
Oct 1999	"Summer wetland course attracts a national crowd"	enVision
Nov 12, 1999	"OSU announces new wetlands observatory"	The Lantern
Nov 15, 1999	"OSU unveils wetland pavilion, plans for $2.8 million research facility	The Lantern
Dec 1999	"The SandefurWetland Pavilion..."	enVision
Dec 3, 1999	"OSU plans on-campus wetland for experiments"	The Lantern
Dec 12, 1999	"OSU wetlands hardly hibernating"	Columbus Dispatch

Table 6. Development support for the Olentangy River Wetland Research Park through 1999*.

Year	Number of donations	Total amount of donations	In-kind donations	Endowment donations	General cash donations
1999	146	$115,576	$3,705	$94,050	$17,821
1998	149	$98,839	$28,624	$3,985	$66,230
1997	168	$78,228	$13,503	$300	$64,425
1996	146	$221,889	$200,283	$4,000	$17,605
1995	108	$97,184	$36,516	$11,000	$49,668
1994	86	$62,686	$48,744		$13,942
1993	46	$259,206	$25,606		$233,600
1992	7	$59,347	$6,327		$53,020
TOTAL	856	$992,953	$363,308	$113,765	$515,880

* support to date has been used to complete Phase 1 and Phase 2 and to establish an endowment for the site. Some more recent monies are earmarked for the new building.

and a major wetland library. Greenhouses for plant experiments could also be constructed adjacent to the building later. The cost of the research building was estimated by the University Architect's office to be $2.8 million (Table 8). Late in 1998 we sent a proposal to the Ohio Board of Regents for $1.4 million of this amount. We won $1,180,000 from the Board of Regents in a spirited competition with academic consortia and universities from throughout Ohio.

Wetland Endowment

In addition to the capital needs described above, the natural ecosystems and site infrastructure at the ORWRP will require continual maintenance and upkeep. A goal of $1.3 million has been established for an endowment to this campus natural area in perpetuity. By the end of 1999, $114,000 had been raised in endowments for the site in two endowment accounts. One account is specifically to support the undergraduate site engineer who is responsible for the upkeep of the ORWRP.

Summary

The Olentangy River Wetland Research Park has successfully integrated wetland research with University teaching and service through its first nine years since serious planning began. The site has been used by thousands of students and campus visitors for formal and informal learning, and has attracted over $2.7 million to the campus in grants and contracts and another $1 million in donations. We expect to raise another $1.3 million for the building and $1.2 million for the site endowment, making the grant total of extramural money eventually raised for site to $4.7 million. Coupled with the $0.3 million financed through the generosity of OARDC, this is a $5 million construction project. Grants and contracts through OSURF are on top of that. But this is also a laboratory much in the public eye and, in a limited fashion, available for the enjoyment of the public. While activity in teaching, research, and service has increased every year, public use and interest has increased every year too. The Sandefur Wetland Pavilion which was finished in 1999, coupled with the city's bike path which was completed in 1998, make the site much more accessible to the public.

Figure 6. Master plan for the Olentangy River Wetland Research Park.

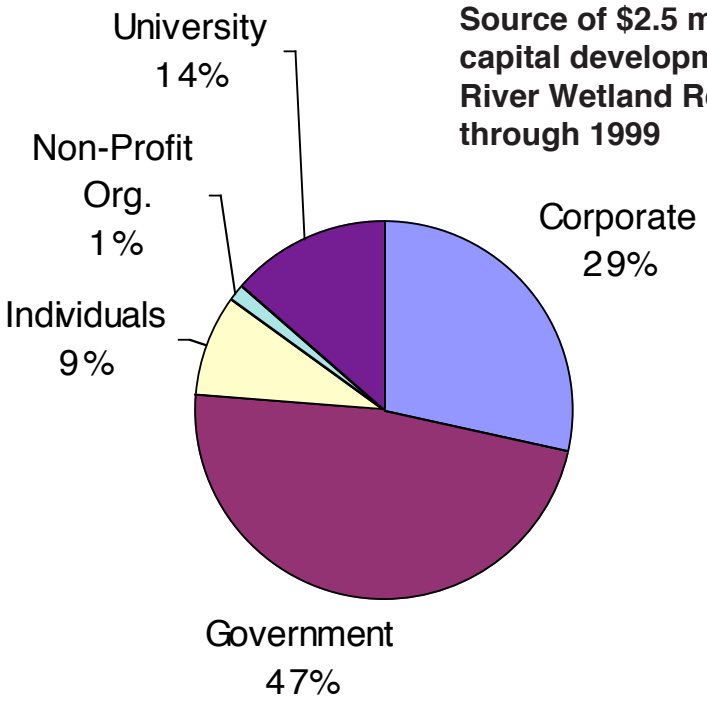

Figure 7. Distribution of sources of support for the construction and maintenance of the Olentangy River Wetland Research Park and Wetland Research and Education Building through 1999. Main "Government " source is Ohio Board of Regents; main "University" source is OARDC, Wooster, OH.

Table 7. Major Corporate and Foundation Supporters of the Olentangy River Wetland Research Park through 1999.

- Mid-American Waste Systems, Inc., Canal Winchester, OH
- Ohio Contractors Association, Columbus, OH
- Wisconsin Road Builders Association, Madison, WI
- U.S. Geological Survey, Columbus, OH
- Discflo Corporation, Santee, CA
- Tumut Gadara Corporation, Columbus, OH
- Kokosing Corporation, Fredricktown, OH
- BBC&M Engineering, Inc., Dublin, OH
- Bischoff & Associates, Inc., Columbus, OH
- Consoer Townsend Envirodyne Engineers, Chicago, IL
- The Heffner Fund, Cleveland, OH
- George J. Igel & Co., Inc., Columbus, OH
- Logan Aluminum Inc., Russelville, KY
- Ohio Geological Survey, ODNR, Columbus
- The O.M. Scott Company, Marysville, OH
- Owens-Corning, Granville and Toledo, OH
- Paul Peterson Company, Columbus, OH
- Rickerbacker Air National Guard, Columbus, OH
- U.S. Geological Survey, Columbus, OH
- The Bill and Edith Walter Foundation, Columbus, OH
- Woodward-Clyde Consultants, Wayne, NJ
- MPW Industrial Services, Inc. Hebron, OH
- The Lorenz Equipment Company, Columbus, OH
- Alban Equipment Company, Columbus, OH
- The Jerry B. Pausch Trust, Northfield, OH
- National Audubon Society of Columbus
- Ohio Lake Management Society, Twinsburg, OH
- Environmental Education Council of Ohio, Inc., Newark, OH
- Soil and Water Conservation Society, Columbus, OH
- City of Dublin, Dublin, OH
- Borror Corporation, Dublin, OH
- Project Management Institute, Plain City, OH
- The Holden Arboretum, Mentor, OH
- Hancor Inc., Findlay, OH
- American Society of Civil Engineers-Cleveland Section
- YSI Incorporated, Yellow Springs, OH
- Fairfield County Soil & Water Conservation District
- Eli Lilly & Co. Foundation, Indianapolis, IN
- Nielsen Ground Water Science, Inc., Galena, OH
- Northwest Garden Club, Columbus, OH
- Plain Local School District, New Albany, OH
- Van Nostrand Reinhold Publishers, New York, NY
- Grandview Garden Club, Grandview, OH
- American Society of Civil Engineers-Central Ohio Section
- Environmental Concern, Inc. St. Michaels, MD
- Columbus Zoological Park, Columbus, OH
- Cooke Consulting, Inc., Columbus, OH
- Indian Lake Hydrologic Unit, Indian Lake, OH
- National Wildlife Federation, Washington, DC
- Greenhouse Aquatics, Inc., Columbus, OH
- Dominion Homes, Columbus, OH
- Agg Rok Materials, Columbus, OH
- First Community Village, Upper Arlington,OH
- James Wiese Graphic Design, Columbus
- Ashland Inc. Foundation, Ashland, KY
- Zande & Associates, Columbus, OH
- Davey Company Foundation, Kent , OH
- Comp Management, Inc., Columbus, OH
- Arrowwood Nursery Inc., Williamstown, NJ

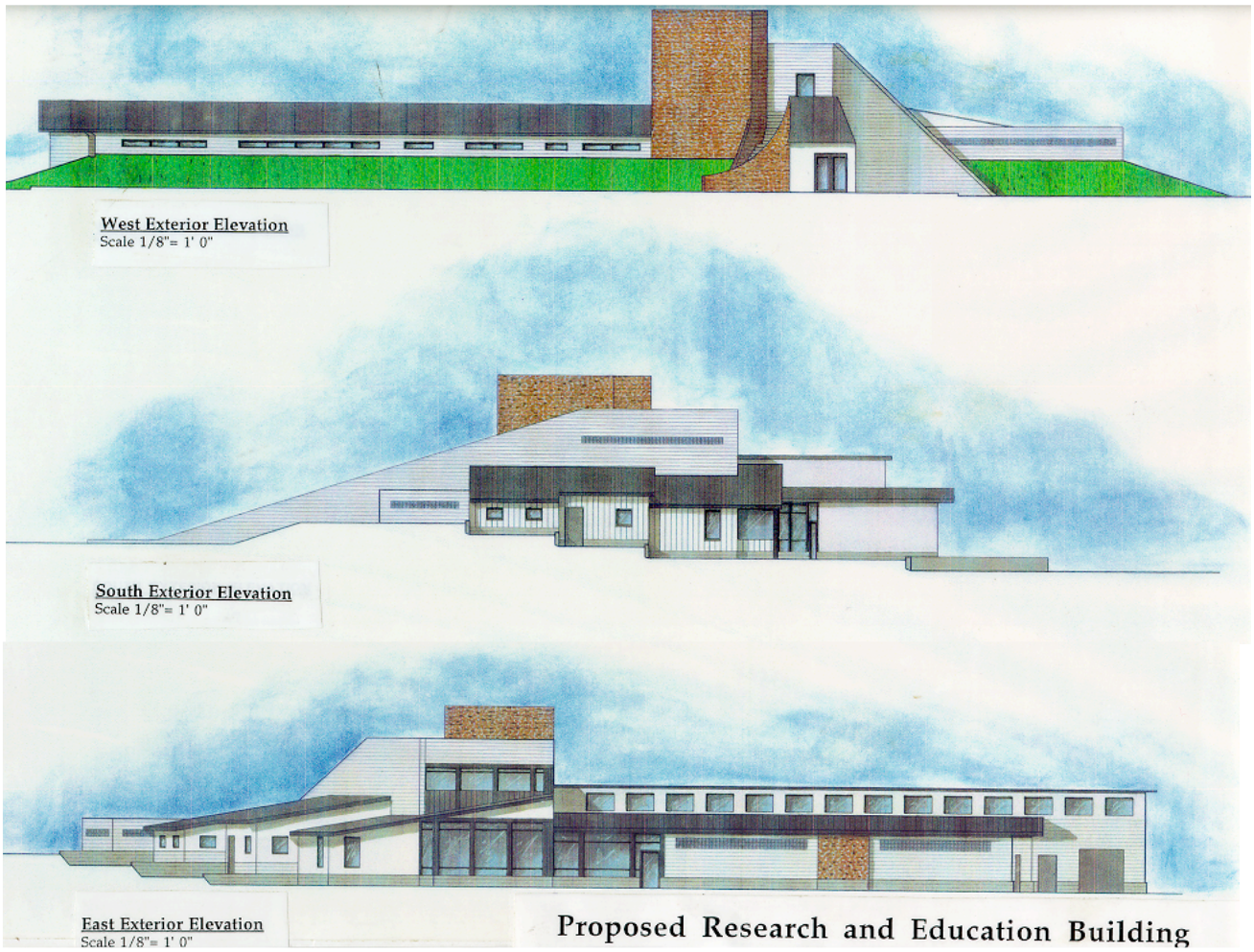

Figure 8. Architect's sketch of west, south, and east exterior elevations of proposed research and education building to be developed at Olentangy River Wetland Research Park.

Table 8. Cost estimate for wetland research and education building shown in Figure 8 *.

Construction Costs	$1,766,151
Movable Furnishings and Equipment (FFE)	470,262
Contingency	335,462
Design Fees	156,292
Artwork 1.0%	28,000
University Administration Fee	33,546
Bidding/Advertising/Permits/Miscellaneous	20,000
Total Project Cost	**$2,809,713**

* Estimate developed by Ohio State University Architect, November 1998